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ORIGINAL ARTICLE

Global practices related to handling of faeces and urine in hospitals - results of an International Federation of Infection Control (IFIC) survey

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Abstract

The International Federation of Infection Control started a worldwide survey about handling of faeces and urine in hospitals in 2012, ending in 2013. There were 1,440 answers from 93 countries. Most of the hospitals reported toilets with water flushing system – but there were few answers from Africa and rural hospitals. Sinks for hand washing near defecation area are available nearly everywhere. Especially in low resource countries, very often relatives and friends have to care for patients if they have to defecate in bed. If bedpans are used, they are multiple use in 76% of cases. Also data about bedpan washers and macerators were reported. It seems that there are big influences on handling of faeces and urine in hospitals by cultural and religious background.

Keywords: Health care surveys; Faeces and nursing; Urine; Hygiene; Hospital and standards.

Introduction

It is estimated that around 40% of the world's population does not have access to appropriate sanitary facilities.[1] According to WHO 15% (1.1 billion people) of the world's population still practice open defecation.[2] Specific hygiene rules and customs develop within each culture or religion[3] and might change over time. This was seen in European medieval times where public toilets allowed socialising, and even business transactions.[4,5]

Of course, defecation and urination are typical inquiries in any medical assessment, and problems about them hint to important symptoms, often leading straight to diagnosis. Also most of multi resistant gram negative bacteria which are dramatically increasing

now are living in our guts and might be transmitted by defecation. Therefore, it might be interesting to have knowledge about the sanitary situation in hospitals in different countries. Unfortunately, it is astonishing that so little has been published about the hygienic situation of defecation and urination in hospitals on a worldwide level. Only van Knippenberg reported on a small survey with 234 answers from 54 countries.[6,7]

This was the reason why the International Federation of Infection Control (IFIC) board agreed to support the implementation of an online survey to obtain more information about this issue in hospitals.

Method

In 2012 the IFIC board approved a project to establish an online survey about the handling of human waste, specifically faeces and urine, in hospitals worldwide.

Following an initial pilot survey, and building on the feedback received, the survey was launched using an electronic tool (SurveyMonkey: http://www.surveymonkey.com/s/IFICwaste). It was also made available for manual completion, through forms distributed by our collaborating partner MEIKO, at educational and/or scientific events (i.e. conferences in Thailand, China, and India) and by ourselves on a symposium in Mongolia. The electronic tool was sent to all member societies of IFIC.

The programme started in July 2012, with a closing date at end of June 2013. The questionnaire was available in 8 languages: Chinese, English, French, German, Japanese, Mongolian, Spanish and Thai.

We sought to inquire about country of reply, number of beds in the hospital facility, site of hospital (urban or rural), the typical situation of defecation, hand hygiene facilities, cleaning of defecation area or toilet, handling of defecation if done in bed, handling of bedpans and help during defecation in bed. Also comments in general and on information on religious and cultural background were invited.

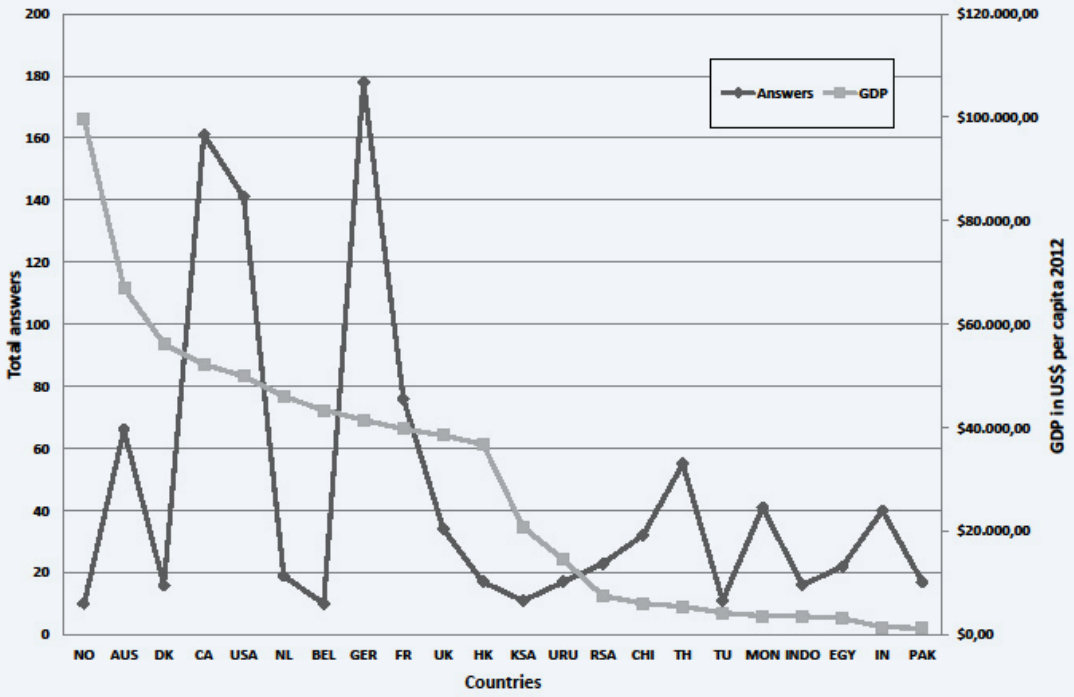


Figure 1: Countries with more than 10 answers and their GDP (2012)

(NO Norway, Aus Australia, DK Denmark, Ca Canada, USA United States, NL Netherlands, Bel Belgium, Ger Germany, Fr France, UK United Kingdom, HK Hong Kong, KSA Saudi Arabia, Uru Uruguay, RSA South Africa, Chi China, Th Thailand, Tu Tunisia, Mon Mongolia, Indo Indonesia, Egy Egypt, In India, Pak Pakistan)

Results

In total 1,440 answers were received, most of them online but 109 answers (8%) were given on paper questionnaires mainly from Thailand, China, India, and Mongolia. Not all participants answered all questions, so the following results may have different numbers of answers for different questions. Surveys were received from 93 countries. The number of beds in the hospitals ranged from 4 (India) to 8,000 (South Africa) with a median of around 350. Answers were received from 837 urban (77%) and 250 rural (23%) hospitals. The highest numbers of answers from rural hospitals came from Mongolia (59%) and Belgium (44%). Data for rural hospitals were given in over 30% for Australia, US, Netherlands, France and Thailand replies.

Figure 1 shows the countries with more than 10 answers with their GDP per capita in 2012 (World Bank. http://data.worldbank.org/indicator/NY.GDP.PCAP.CD).

We also asked who is responsible for /contributes to care if defecation is done in bed (Figure 2). It is obvious that more help is given by relatives/friends/caregivers in low income countries and more by nurses in high income countries.

The results whether bedpans are used and how they are used and cleaned is summarized in table II.

Table I. Description of defecation in hospitals

Question	Answers	% (n)
Typical situation of defecation of patients (n=1,134 answers)	Open defecation outside	1% (13)
	Some sort of bog outside	1% (8)
	Bog inside or outside	1% (14)
	Toilet with water flushing system inside and/or outside	19% (213)
	Toilet with water flushing system inside only	78% (900)
Sinks for hand washing are available near the defecation area	Yes	99% (1,117)
	No	1% (17)
Other types of hand hygiene facilities (alcohol based gels or similar) are available	For staff only	21% (253)
	For patients only	4% (59)
	For staff and patients	75% (919)
The defecation area / toilet is cleaned	Regularly with disinfectant	57% (709)
	Regularly with cleaning agent	41% (509)
	No regular cleaning	2% (31)
Availability of toilets	For each room	65% (733)
	For whole ward only	35% (392)
	No toilets in patients´ rooms were only reported for Norway (but only 8 answers on this question) and Mongolia (all 41 answers). A high percentage of toilets on the hallway only was also reported for Denmark, UK, Hong Kong, Uruguay, South Africa, Thailand, Tunisia, Indonesia, Egypt, India and Pakistan.	
Different toilets for staff and patients	Yes	96% (1,085)
	No	4% (42)
Sex specific toilets	For patients	61% (696)
	For staff	57% (654)

Table II. Usage and cleaning of bedpans

Question	Answers	% (n)
If bedpans are used, they are predominantly	Multiple use	76% (848)
	Single use	24% (274)
Multiple-use bedpans are made from	Plastics	49% (472)
	steel	51% (495)
If multiple-use bedpans are used, a bedpan washer is available		50% (151)
The bedpan washer is using	Chemical disinfectants	29% (227)
	Chemical disinfectants and heat	40% (315)
	Heat only	31% (247)
In case of single-use bedpan, a macerator is used		38% (110)
Habits if bedpan cleaning is done manually	With water only	17% (149)
	With cleaning agent (detergent)	39% (350)
	With disinfectant	44% (400)
	Using a brush	30% (229)
	Using only paper	2% (18)
	Done in dirty utility room	61% (505)
	Done in patient's bathroom	44% (365)
	Done in other rooms	10% (83)

Nearly 100% use of multiple use bedpans was reported for Norway (8 = 100%), Denmark (13 = 93%), Netherlands (14 = 93%), Germany (152 = 100%), France (63 = 97%), Hong Kong (13 = 100%), Uruguay (17 = 94%), Thailand (50 = 98%), Tunisia (9 = 100%), Mongolia (31 = 100%) and Indonesia (13 = 93%). On the other hand, a very high rate of single use bedpans was reported for Australia (47 = 73%) and UK (24 = 89%), and rather high rates for Canada (65 = 46%), US (65 = 49%) and China (17 = 59%).

Plastic bedpans are used mostly in US (68 = 93%), Netherlands (14 = 100%), France (60 = 94%), China (13 = 100%) and Tunisia (10 = 91%) whereas steel bedpans are used most of all in Germany (148 = 91%) and Indonesia (12 = 80%).

Macerators for single-use bedpans are predominantly used in Australia (73%) and UK (95%), but not in Canada (48%), US (7%), China (14%), and Thailand (8%).

Table III. Estimation how many patients are defecating in bed

Estimated % of patients who defecate in bed	Number of Responses (%)
<5	366 (36)
5-10	260 (26)
10-20	242 (24)
20-50	104 (10)
>50	31 (3)

Bedpan washers use chemical disinfectants most of all in US, Uruguay, Tunisia and India, and heat only in Australia, Denmark, Netherlands, Germany and Hong Kong. Bedpans are sterilized in 103 cases (13%). The use of water only for manual cleaning was mentioned from Canada (14%), US (31%), Netherlands (20%),

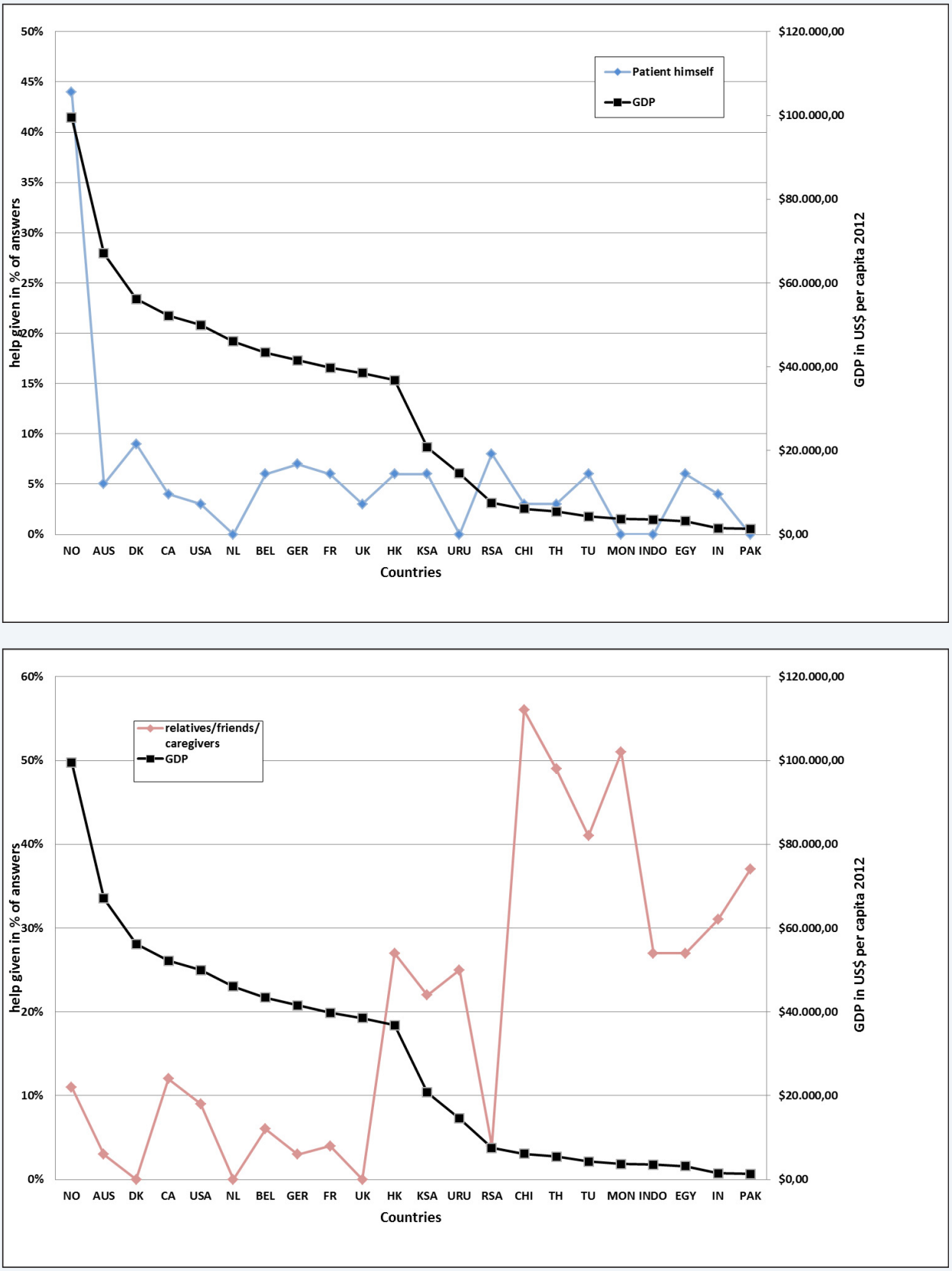
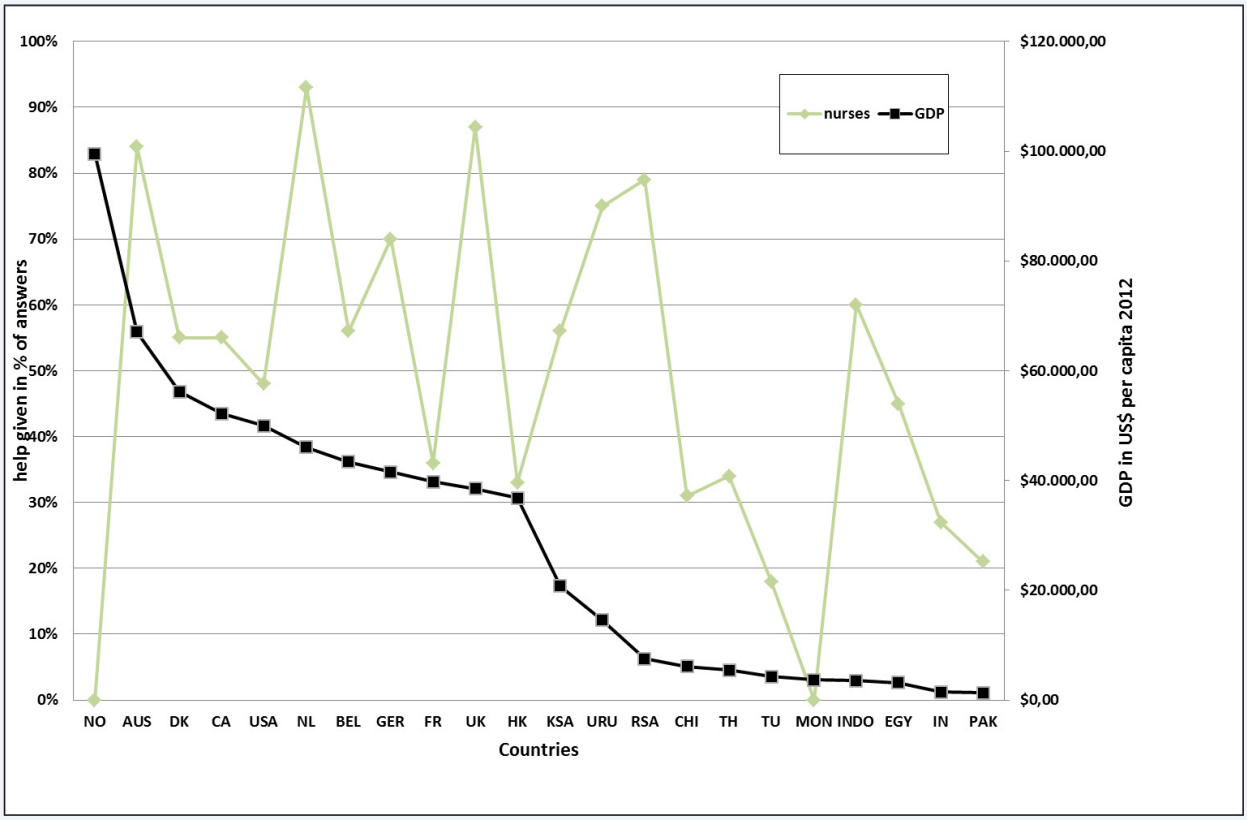


Figure 2. Who is helping the patient if defecation is done in bed (% of answers for each country)
(for land abbreviations see legend in figure 1)



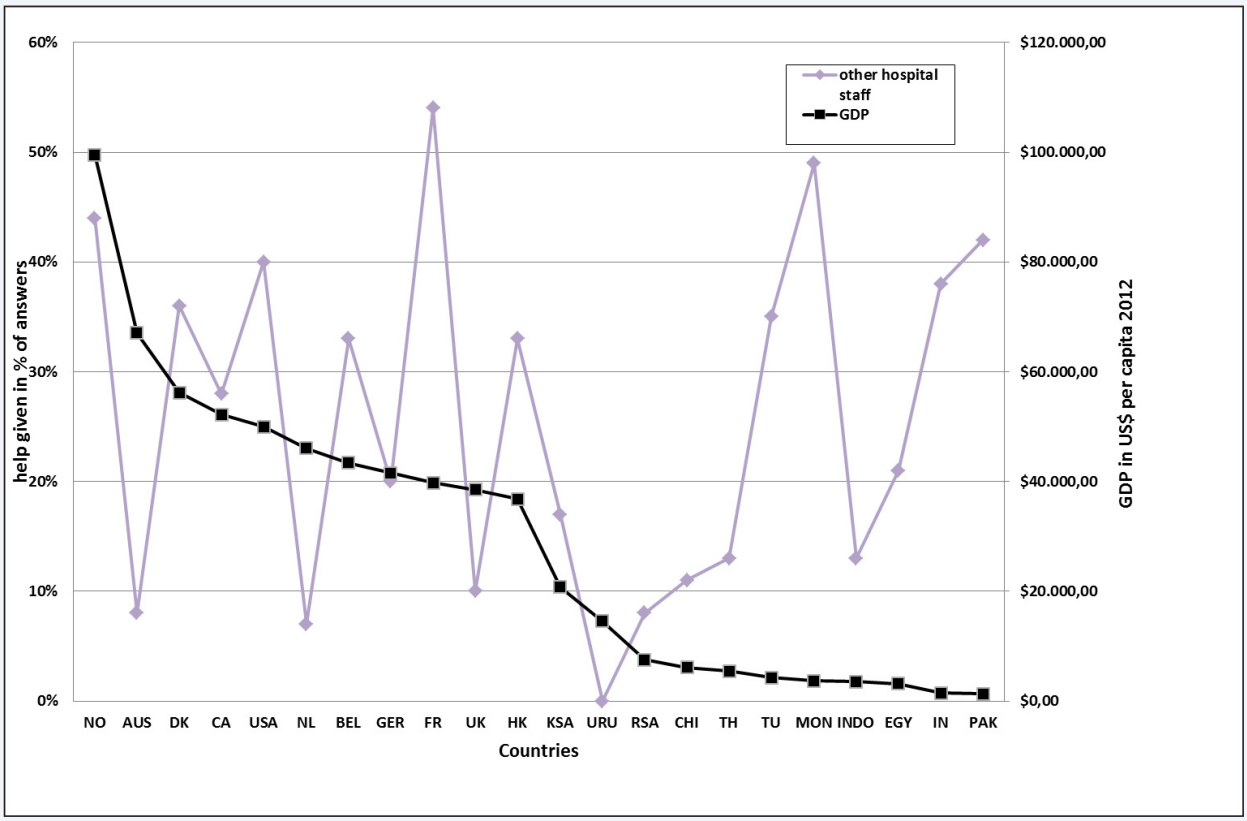


Figure 2 continued...

France (9%), China (20%), Egypt (19%) and Pakistan (18%). Patient's bathrooms for manual cleaning of bedpans are used very often in Canada (35%), US (65%), France (45%), Saudi Arabia (56%), Thailand (54%), Mongolia (84%), Tunisia (88%), Egypt (69%), India (45%) and Pakistan (77%).

We also asked how many patients are estimated to defecate in bed (Table III).

If no bedpan is used, defecation is done in bed without any additional means in 68 cases (9%), in nappies in 649 cases (86%), on special textile in 116 cases (15%) and on paper in 27 cases (4%).

Hand hygiene facilities are available for patient/staff/caregivers who help patients after defecation in 1.011 hospitals (97%).

Additional comments were given by 280 people (19%) from Australia, Belgium, Canada, Egypt, France, Germany, India, Indonesia, Pakistan, Saudi Arabia, South Africa, Spain, UK and US. Comments regarding religious and cultural/historical influences were given by 337 people (23%) from Australia, Egypt, France, Germany, India, Indonesia, Pakistan, Saudi Arabia, South Africa, Spain, UK and US.

Important comments will be cited in the discussion section.

Discussion

Replies were received from a large number of countries. Unfortunately, there were few answers from African countries or from South America. In addition, most of answers came from urban hospitals. This may be the reason why nearly all hospitals were reported to have toilets with water flushing system, sinks for hand washing and a lot of hand hygiene facilities like alcohol based disinfectants. Only 2% neglected regular cleaning of toilets.

For example, we know from Mongolia that even in the capital Ulaanbaatar, toilet facilities in family doctors' practices may be outside and without flushing water (photo 1 – taken by first author in 2010).[8,9] Comments from Pakistan reported that the hygienic situation of hospital toilets is often very unsatisfactory. Also water supply might frequently be broken so that people use "LOTA" (small, usually spherical water vessel of brass, copper or plastic used in parts of South Asia, Wikipedia) to clean themselves after defecation (Photo 2 – from one comment). Reports from Nigeria say that there are great deficits in the water supply of hospital toilets and they often lack hand washing facilities in rural primary health care centres.[10] It is therefore speculated that due to the bias presented by responses from mainly urban hospitals, the situation worldwide appears better than it really is, and that rural facilities may present more of a problem.

Photo 1: Toilet outside a family doctor practice (primary level) in Chingeltej District, Ulaanbaatar, Mongolia

Photo 2: Typical "LOTA" used for cleaning after defecation in case no shower is available, Pakistan

Different toilets for staff and patients are seemingly available in most hospitals (96%) but this may not represent the situation everywhere in rural areas. Sex specific toilets for staff are available in over 50% of hospitals. It is interesting that sex specific toilets are not very common in some high resource countries like Australia, Canada or US, whereas they are more often available in countries with lower resources like India or Pakistan. This might hint to cultural and/or religious background differences.

If a patient has to defecate in bed – because of immobility – he/she is usually assisted by nurses or other hospital staff. Interestingly, it seems that also in some high income countries like Canada and US, relatives often offer help, but their role is more important in countries with lower GDP, especially in China, Thailand, Tunisia and Mongolia. One comment from the US reported that some cultures are reluctant to ask for assistance and prefer the help of family members.

If bedpans are used, they are most of all multiple use, especially in countries like Denmark, Netherlands, Germany, France, Thailand and Mongolia. On the other hand, there are countries with a very high rate of single use bedpans, like Australia and UK. Especially in these two countries, macerators are mostly used whereas other countries with a high percentage of single use bedpans do not use this technology, e.g. US or China. There were some comments from Australia that in some states macerators are not allowed by the local water authority; also some hospitals seem not to use them because of frequent equipment failures. The reasons for these very different practices are not obvious. We speculate that some situations may have developed by chance, e.g. that some company dominated the national market. For example, there seems no rationale to explain that the UK has nearly 100% single use bedpans and Germany the opposite with nearly 100% multiple use bedpans made from steel. Also there might have been a strong interference with the development of national guidelines.[11]

It seems that multiple use bedpans are cleaned by hand very often; in around 20% with water only. This was also reported for some high income countries like US.

Manual cleaning is done most of all in dirty utility rooms, but in over 40% they are cleaned in patients' bathrooms. This was reported for both high as well as low income countries, including Canada, US, France, Saudi Arabia, Thailand, Mongolia, Tunisia, Egypt, India and Pakistan.

There were many comments from Belgium, Canada and US that the advice from IPC department is to clean and disinfect bedpans after each use,[12] but nurses do it only with water in the patient's room or bathroom (even in common bathrooms for many patients) because of workload, sometimes followed by wiping or spraying with disinfectant. This was also reported in a smaller survey.[6,7] Deficits like these in reprocessing of bedpans should be kept in mind if thinking about different rates of multi-resistant bacteria in different countries.

Also there were different comments from Canada and US that single use bags/liners are frequently used inside the bedpan (some of them containing absorbing gel) which are then discarded in the waste stream. These practices are relatively new and their safety and claims regarding decreased contamination of the environment await additional support. Further comments from Canada and US reported that disposable bedpans are reused for one patient and thrown away after his/her discharge.

Asking for the estimated percentage of patients defecating in bed, the rate seems to be higher in high resource countries – this of course may be due to higher level of medical care and more severely ill patients.

Comments from Egypt hinted to the use of ground toilets in the Arab world (photo 3 – taken by first author in 2010), not because of religious but cultural reasons.

Photo 3: Typical ground toilet and water supply in a small hospital (top) and toilet in a big hospital (bottom) (see the bedpan) in Damaskus, Syria

Different comments from Egypt, India, Pakistan, Saudi Arabia and South Africa mentioned that near-to-toilet water supply (Photo 4 – from one comment) is needed because of the religious based need to clean themselves and wash hands after defecation and urination. This is the reason in some countries why the right hand is typically used for eating and left one for self-cleaning.[13,14]

Photo 4: A typical hand shower used when people clean by hand in countries with no toilet paper, Oman

For India, it was commented that "ward boys" are caring for cleanliness on wards, but their education is very bad and cleaning and disposing faeces is seen as a dirty job.

In Pakistan it was commented that usually Christian (and Hindu) staff are responsible for cleaning toilets and as result cleaning breaks down during Christmas time.

The GDP of the countries showed a wide range. In our opinion, it does not make sense to group countries according to their GDP and try to define some common policies for faeces and urine handling according to these groups. On the contrary, in some respect there seem to be quite large differences between countries of similar economic status - e.g. regarding sex specific toilets, using of single or multiple use bedpans or cleaning of bedpans.

On the other hand it seems that the influence of culture and religion is important. For example western countries prefer to use toilet paper whereas in Muslim countries cleaning after defecation is done by hand (left hand) and water only. In Pakistan, culturally it has been taught that washing should be done with running water and therefore hand showers are used and this is followed by wiping area with toilet tissue, if available. If hand showers are not available then 'LOTA' (photo 2) is used for cleaning after defecation and this is followed by wiping area with toilet tissue, if available. According to Muslim regulations, one should clean with water only if available, while tissue paper would be an alternative if water is not available.[15]

From the observational point of view, Muslims do wash body orifices and hands five times per day as prerequisite before praying called 'wuḍū' or 'minor ablution'.[16] This may have an impact on minimizing the microbial load of normal flora. It is known for India that Muslims typically are poorer, less educated and with less access to clean water, but their infant mortality is lower than that of Hindus. It is speculated that this may be a consequence of hygiene rituals as Hindu tradition is defecation in the open, far from home, to avoid ritual impurity; additionally the lowliest in society, "untouchables", have to clear human waste.[3]

We do not know any investigations showing advantages and disadvantages of either (tissue paper vs. water only) method. This is very interesting because there is no doubt that faecal bacteria are one of the most important causes for infectious diseases; these bacteria are often multi resistant gram negative bacteria. Therefore, it is astonishing that so few publications have tackled this issue.[17]

There are some limitations of our study:

- The number of hospitals answering for each country may not be enough to give a representative overview over the respective situation.
- There a too few answers from rural hospitals so that the situation there might be underrepresented. We presume that the situation in urban hospitals usually is much better than in the countryside.
- Also there were few answers from Africa and South America so that this survey might not give a valid view on the situation there.
- Finally, about 10% of the answers were given at conferences were our corporate partner MEIKO was an exhibitor and distributed the paper questionnaires and collected them. So some of the persons answering might have had a specific interest in the issue.

To our knowledge, this is the first worldwide study providing some insight into the handling of faeces and urine in hospitals. We recognize it is only a descriptive study, and the results have to be taken with some caution because of relatively few answers from some of the countries and also because of the reduced number of replies from rural hospitals.

The results hint to the need to extend our knowledge about this issue in many countries. It may not be easy to make recommendations because of historical, cultural and religious backgrounds.

The next steps should be to gain more information using validated statistically supported questionnaires. Information gleaned from a more detailed study may help to provide more detailed information to users, and help to develop better education and training about the problems resulting from faeces and faecal bacteria. More detailed recommendations might need a bigger intercultural and interreligious dialogue to be accepted by as many people as possible.

Conflict of interest

MEIKO (Offenburg, Germany) is one of IFIC's Corporate Partners. Donations from MEIKO are used for global work of IFIC and not for this survey. There was no influence of MEIKO on development of the survey, methods, results or discussion. Translation of the survey in Chinese, Japanese, and Thai was done by MEIKO and paper questionnaires of the survey distributed on conferences in Thailand, China, and India.

Acknowledgement and thanks

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References

1. Black M, Fawcett B. The last taboo. Opening the door on the global sanitation crisis. Earthscan, London 2008.
2. WHO: Progress on drinking water and sanitation. 2012 Update.
3. Sanitation in India. The final frontier. The Economist. 19 July 2014.
4. Roeber U, Bernsmeier U, Manieren. Geschichten von Anstand und Sitte aus sieben Jahrhunderten. Edition Braus, Berlin 2009.
5. Plumpsklo SM, Örtchen AS. Edition: anderweit. Suderburg-Hösseringen 2006.
6. van Knippenberg-Gordebeke GG. Dutch surveys bedpan management (1990 & 2010): progress in correct use of washer disinfectors. Presentation at the International Conference on Prevention & Infection Control (ICPIC). *BMC Proceedings* 2011; **5(Suppl 6):** 308.
7. van Knippenberg-Gordebeke G. The faecal quandary – bedpan management in a modern age. 2011. http://www.webbertraining.com/files/library/docs/372.pdf
8. Popp W, Badarch U, Tsevegjav A, *et al.* Hospital hygiene in Mongolia and the MeshHp project. *Int J Infect Control* 2013; **9(2)**. http://dx.doi.org/10.3396/IJIC.v9i2.018.13
9. Popp W, Jigjidsuren A, Badarch U, *et al.* Waste management in Mongolian hospitals. *Int J Infect Control* 2014; **10(1)**. http://dx.doi.org/10.3396/IJIC.v10i1.008.14.

10. USAID: An assessment of injection safety and health care waste management in Nigeria. Arlington 2014.
11. DIN EN ISO 15883-3: Reinigungs-Desinfektionsgeräte – Teil 3: Anforderungen an und Prüfverfahren für Reinigungs-Desinfektionsgeräte mit thermischer Desinfektion für Behälter für menschliche Ausscheidungen (ISO 15883-3:2006). Beuth Verlag 2009.
12. Lobè C, Boothroyd LJ, Lance JM. Bedpan processing methods: making an informed choice. *Can J Infect Control* 2011; fall: 165-171.
13. Abram D, Edwards N, Ford M, *et al.* A rough guide to India. Roughguides, 2011.
14. Blume J. Von Donnerbalken und innerer Einkehr. Eine Klo-Kulturgeschichte. Verlag Die Werkstatt, Göttingen 2004.
15. Buḫārī, Muḥammad ibn Ismāʿīl al-: Ṣaḥīḥ al-Buḫārī, 4 vols., Dār al-Kutub al-ʿIlmīya, Bairūt 1999, v.1, 48, No 153.
16. Fischer N. "Wash yourself, for Islam is cleanliness!" Hygiene, grooming and ritual purification in Islam. In: Leismann B, Padberg M, Eds. Intimacy! Bathing in art. Wienand, Köln 2010, 288-293.
17. Best EL, Sandoe JAT, Wilcox MH. Potential for aerosolization of *Clostridium difficile* after flushing toilets: the role of toilet lids in reducing environmental contamination risk. *J Hosp Infect* 2012; **80:** 1-5. http://dx.doi.org/10.1016/j.jhin.2011.08.010